

# TEST REPORT

Report No.: SHE21120050-02BE

Date: 2022-01-25

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**Applicant** : Shanghai XinMiaoLink Technology Co., Ltd.  
**Address of Applicant** : Floor 1, building 28, No. 6055, Jinhai highway, Fengxian District, Shanghai, China

**Product Name** : Wi-Fi&BLE Module  
**Model No.** : X-C13SM-0, X-C13SM-1  
**Sample No.** : E21120050-01#01  
E21120050-02#01  
E21120050-02#03  
**FCC ID** : 2A3M5-X-C13SM

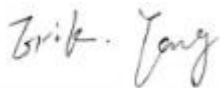
**Standards** : FCC CFR47 Part 15, Subpart C

**Date of Receipt** : 2021-12-15  
**Date of Test** : 2021-12-16 ~ 2022-01-24  
**Date of Issue** : 2022-01-25

**Remark:**

*This report details the results of the testing carried out on one sample, the results contained in this report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.*

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(Authorized signatory: Guoyou Chi)

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## 1 General Information

### 1.1 Testing Laboratory

|              |                                                      |
|--------------|------------------------------------------------------|
| Company Name | ICAS Testing Technology Service (Shanghai) Co., Ltd. |
| Address      | No.1298 Pingan Rd, Minhang District, Shanghai, China |
| Telephone    | 0086 21-51682999                                     |
| Fax          | 0086 21-54711112                                     |
| Homepage     | www.icasiso.com                                      |

### 1.2 Details of Application

|                           |                                                                                    |
|---------------------------|------------------------------------------------------------------------------------|
| Applicant Company Name    | Shanghai XinMiaoLink Technology Co., Ltd.                                          |
| Address                   | Floor 1, building 28, No. 6055, Jinhai highway, Fengxian District, Shanghai, China |
| Contact Person            | Yue liren                                                                          |
| Telephone                 | 13818419836                                                                        |
| Email                     | tomas@chipfresh.com                                                                |
| Manufacturer Company Name | Shanghai XinMiaoLink Technology Co., Ltd.                                          |
| Address                   | Floor 1, building 28, No. 6055, Jinhai highway, Fengxian District, Shanghai, China |

### 1.3 Details of EUT

|                             |                                                                   |
|-----------------------------|-------------------------------------------------------------------|
| Product Name                | Wi-Fi&BLE Module                                                  |
| Brand Name                  | N/A                                                               |
| Test Model No.              | X-C13SM-0                                                         |
| Series Model No.            | X-C13SM-1                                                         |
| Difference Description      | All the same except for the model name and antenna type           |
| FCC ID                      | 2A3M5-X-C13SM                                                     |
| Mode of Operation           | Bluetooth BLE                                                     |
| Frequency Range             | 2400MHz ~ 2483.5MHz                                               |
| Number of Channels          | 40 (at intervals of 2 MHz)                                        |
| Modulation Type             | GFSK                                                              |
| Antenna Type                | X-C13SM-0 Model: External antenna<br>X-C13SM-1 Model: PCB antenna |
| Antenna Gain                | X-C13SM-0 Model: 3dBi<br>X-C13SM-1 Model: 2dBi                    |
| Test Voltage                | DC 3.3V                                                           |
| Hardware version            | V1.0                                                              |
| Software version            | V1.00.10                                                          |
| RF power setting in TEST SW | Bouffalo Lab Dev Cube V1.6.5                                      |

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## 1.4 Test Methodology

|                                   |                                                                    |
|-----------------------------------|--------------------------------------------------------------------|
| 47 CFR Part 15, Subpart C         | Miscellaneous Wireless Communications Services                     |
| KDB Publication 558074 D01 v05r02 | Part 15.247 Meas Guidance                                          |
| ANSI C63.10-2013                  | American National Standard for Testing Unlicensed Wireless Devices |

### Note(s):

All test items were verified and recorded according to the standards and without any addition/deviation/exclusion during the test.

## 1.5 Test Summary

| Test Item                                               | FCC Rules                             | Result |
|---------------------------------------------------------|---------------------------------------|--------|
| Antenna Requirement                                     | FCC Part 15.247(b)(4),<br>Part 15.203 | PASS   |
| Peak Output Power                                       | FCC Part 15.247(b)(3)                 | PASS   |
| 6dB Bandwidth                                           | FCC Part 15.247(a)(2)                 | PASS   |
| Power Spectral Density                                  | FCC Part 15.247(e)                    | PASS   |
| Conducted Spurious Emission & Authorized-band band-edge | FCC Part 15.247(d)                    | PASS   |
| Radiated Spurious Emission                              | FCC Part 15.247(d), 15.205, 15.209    | PASS   |
| Band Edge (Restricted-band band-edge)                   | FCC Part 15.247(d), 15.205, 15.209    | PASS   |
| Conducted Emission on AC Mains                          | FCC Part 15.207(a)                    | PASS   |

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## 2 Test Condition

### 2.1 Environmental conditions

|                            |          |
|----------------------------|----------|
| Temperature (°C)           | 18-25    |
| Humidity (%RH)             | 40-65    |
| Barometric Pressure (mbar) | 960-1060 |

### 2.2 Equipment List

| Name of Equipment                   | Manufacturer    | Model        | Serial No. | Cal. Date  | Cal. Due Date |
|-------------------------------------|-----------------|--------------|------------|------------|---------------|
| Spectrum Analyzer                   | Keysight        | N9020B       | MY59260184 | 2021-08-17 | 2022-08-16    |
| Spectrum Analyzer                   | Rohde & Schwarz | FSV40N       | 101450     | 2021-06-10 | 2022-06-09    |
| EMI Test Receiver                   | Rohde & Schwarz | ESPI3        | 100173     | 2021-06-10 | 2022-06-09    |
| EMI Test Receiver                   | Rohde & Schwarz | ESR 7        | 101911     | 2021-06-10 | 2022-06-09    |
| V-network                           | SCHWARZBECK     | NSLK 8127    | 8127-902   | 2021-06-10 | 2022-06-09    |
| Wideband Radio Communication Tester | Rohde & Schwarz | CMW 500      | 100687     | 2021-08-13 | 2022-08-12    |
| Broadband Antenna                   | SCHWARZBECK     | VULB9163     | 9163-1037  | 2021-06-08 | 2022-06-07    |
| Horn Antenna-18G                    | SCHWARZBECK     | BBHA9120D    | 9120D-1775 | 2021-06-08 | 2022-06-07    |
| Loop Antenna                        | SCHWARZBECK     | FMZB 1513    | N/A        | 2020-11-23 | 2022-11-22    |
| Horn Antenna-40G                    | YINGLIAN        | LB-180400-KF | N/A        | 2021-06-12 | 2022-06-11    |
| EMC chamber 9*6*6 (L*W*H)           | CHANGNING       | 966          | N/A        | 2020-06-09 | 2023-06-08    |
| Shielded Enclosure 8*5*4 (L*W*H)    | CHANGNING       | 854          | N/A        | 2020-06-09 | 2023-06-08    |
| Test Software                       | BL              | BL410_E      | N/A        | N/A        | N/A           |
| Test Software                       | BL              | BL410_R      | N/A        | N/A        | N/A           |

### 2.3 Measurement Uncertainty

| Parameter                       | Frequency       | Uncertainty |
|---------------------------------|-----------------|-------------|
| Antenna Port Conducted Emission | < 1GHz          | ± 1.50 dB   |
|                                 | > 1GHz          | ± 1.50 dB   |
| Radiated Emission               | 30 MHz – 1 GHz  | ± 3.42 dB   |
|                                 | > 1GHz          | ± 4.20 dB   |
| Conducted Emission on AC Mains  | 9 kHz to 30 MHz | ± 1.71 dB   |

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## 3 Test Set-up and Operation Modes

### 3.1 Details of Test Mode

Using test software (Bouffalo Lab Dev Cube V1.6.5) was control EUT work in continuous transmitter and receiver mode.  
Select test channel as below:

| Channel                   | Frequency |
|---------------------------|-----------|
| The lowest channel(CH0)   | 2402MHz   |
| The middle channel(CH19)  | 2440MHz   |
| The Highest channel(CH39) | 2480MHz   |

The basic operation modes are:

- A. On
  - 1. BLE mode
    - a. Transmitting
      - i. Low Channel
      - ii. Middle Channel
      - iii. High Channel
    - b. Receiving
  - 2. Normal working with Bluetooth on
- B. Standby
- C. Off

### 3.2 Special Accessories and Auxiliary Equipment

| Description | Manufacturer | Model No.         | Serial No. |
|-------------|--------------|-------------------|------------|
| Laptop 1    | Lenovo       | TP00083A          | N/A        |
| Laptop 2    | HP           | HP ZHAN 66 Pro G1 | 5CD7438R1G |
| USB Cable   | N/A          | N/A               | N/A        |

### 3.3 Support Software

| Description | Manufacturer | Software Name                   |
|-------------|--------------|---------------------------------|
| Software    | Bouffalo Lab | Bouffalo Lab Dev Cube<br>V1.6.5 |

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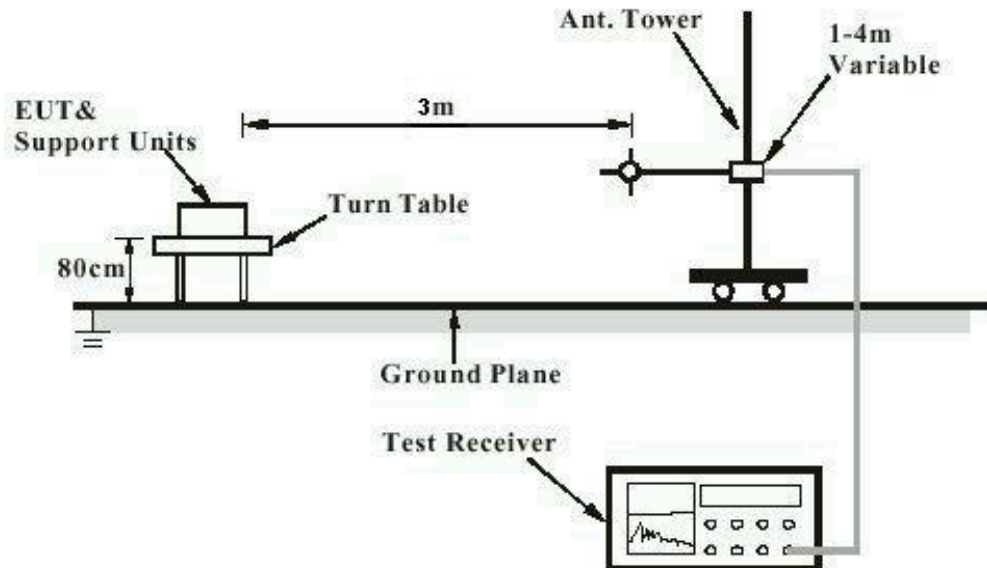
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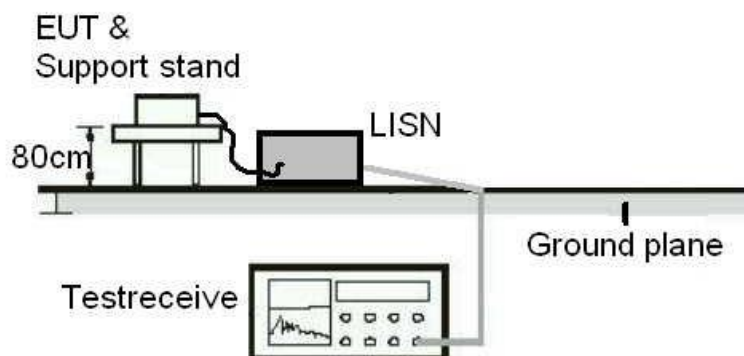
## 3.4 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1GHz are done with a table height of 1.5m. In addition, there is RF absorbing material on the floor of the test site for above 1GHz measurement.

Diagram of Measurement Equipment Configuration for Conduction Measurement



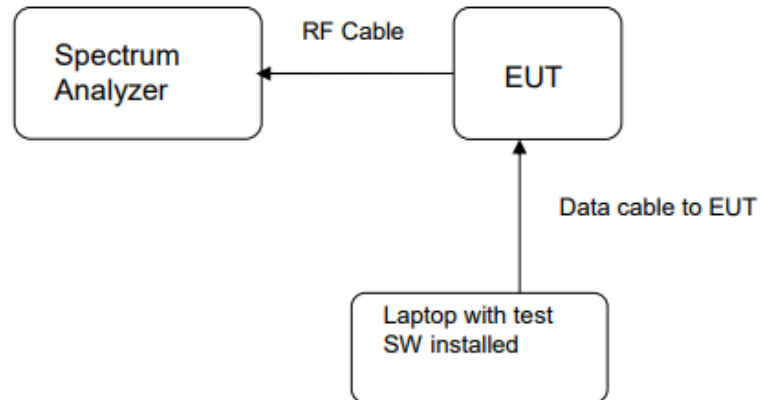
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## Diagram of Measurement Equipment Configuration for Transmitter Measurement



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## 4 Test Results

### 4.1 Transmitter Requirement & Test Suites

#### 4.1.1 Antenna Requirement

RESULT:

**PASS**

|               |                                                                                    |
|---------------|------------------------------------------------------------------------------------|
| Test standard | : FCC Part 15.247(b)(4), Part 15.203                                               |
| Requirement   | : The use of approved antennas only with directional gains that do not exceed 6dBi |

According to the manufacturer declaration, the EUT has an antenna with a directional gain of 3 dBi. The antenna is an External antenna with no possibility of replacement with a non-approved antenna by the end-user.

Therefore, the EUT is considered to comply with this provision.

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## 4.1.2 Peak Output Power

RESULT:

PASS

Test standard : FCC Part 15.247(b)(3)

Requirement : ANSI C63.10-2013, KDB 558074

Kind of test site : Shielded room

### Test setup

Test Channel : Low/Middle/High

Operation Mode : A.1.a

Ambient temperature : 25°C

Relative humidity : 50%

Table 1: Peak Output Power

| Test Mode | Test Channel<br>(MHz) | Measured Peak Power |      | Limit<br>(W) |
|-----------|-----------------------|---------------------|------|--------------|
|           |                       | (dBm)               | (mW) |              |
| BLE       | 2402                  | 7.41                | 5.51 | ≤1           |
|           | 2440                  | 7.46                | 5.57 |              |
|           | 2480                  | 6.85                | 4.84 |              |

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Figure 1: Peak Output Power, 2402MHz

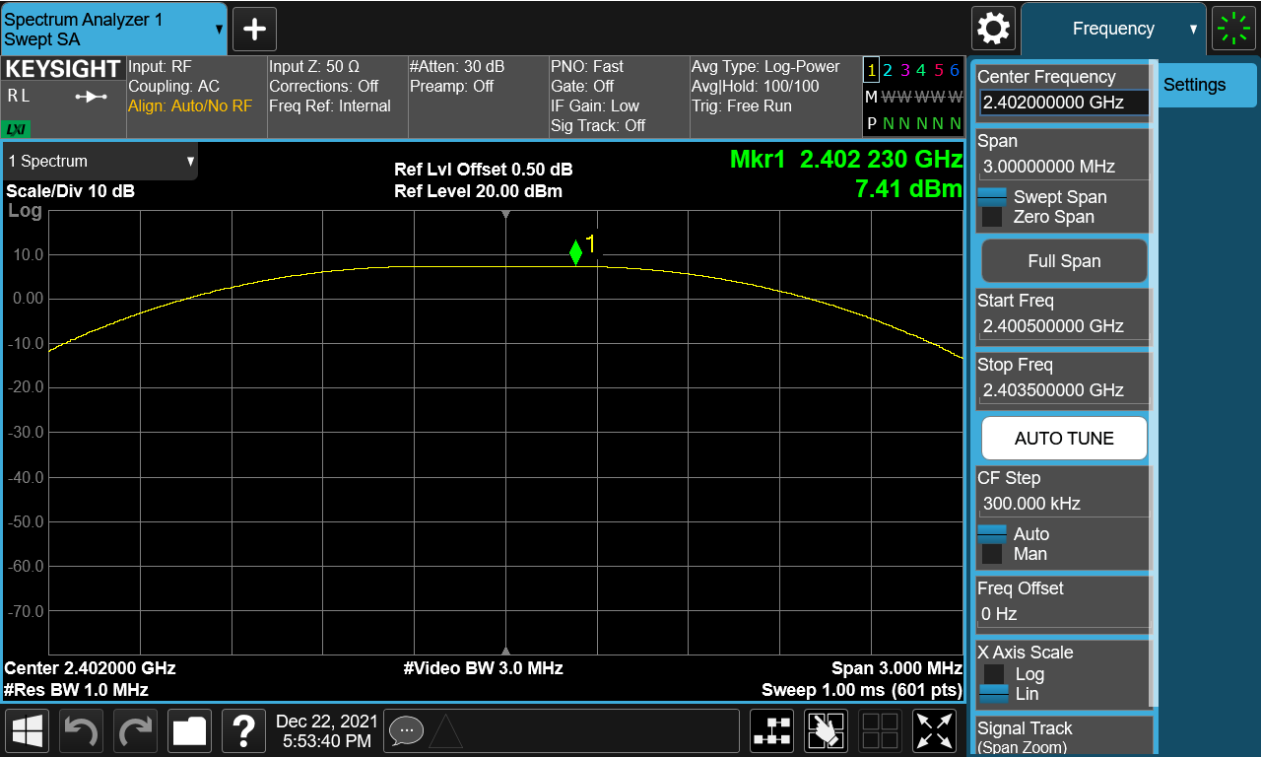


Figure 2: Peak Output Power, 2440MHz



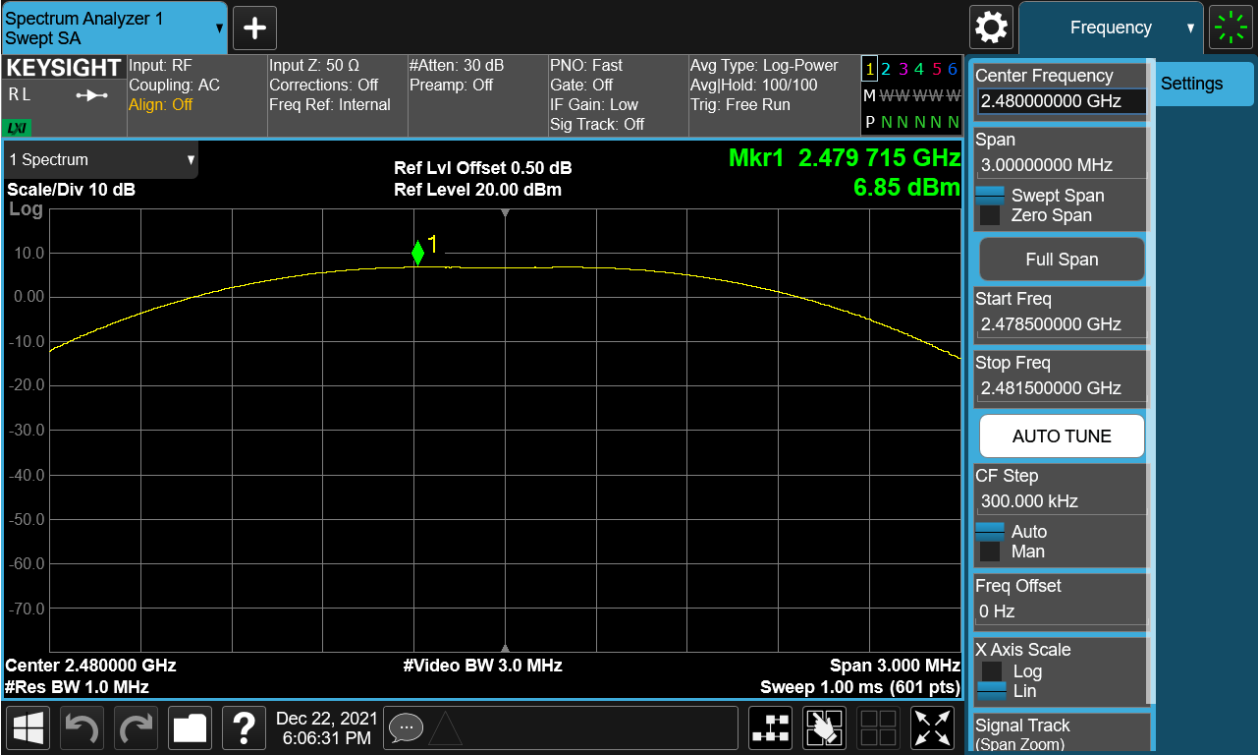
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Figure 3: Peak Output Power, 2480MHz



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## 4.1.3 6dB Bandwidth

RESULT:

PASS

Test standard : FCC Part 15.247(a)(2)  
Requirement : ANSI C63.10-2013, KDB 558074  
Kind of test site : Shielded room

### Test setup

Test Channel : Low/Middle/High  
Operation Mode : A.1.a  
Ambient temperature : 25°C  
Relative humidity : 50%

Table 2: 6dB Bandwidth

| Test Mode | Test Channel (MHz) | 6dB Bandwidth (MHz) | 6dB Bandwidth Limit |
|-----------|--------------------|---------------------|---------------------|
| BLE       | 2402               | 0.6320              | $\geq 0.5$ MHz      |
|           | 2440               | 0.6613              |                     |
|           | 2480               | 0.6721              |                     |

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Figure 4: 6dB Bandwidth, 2402MHz

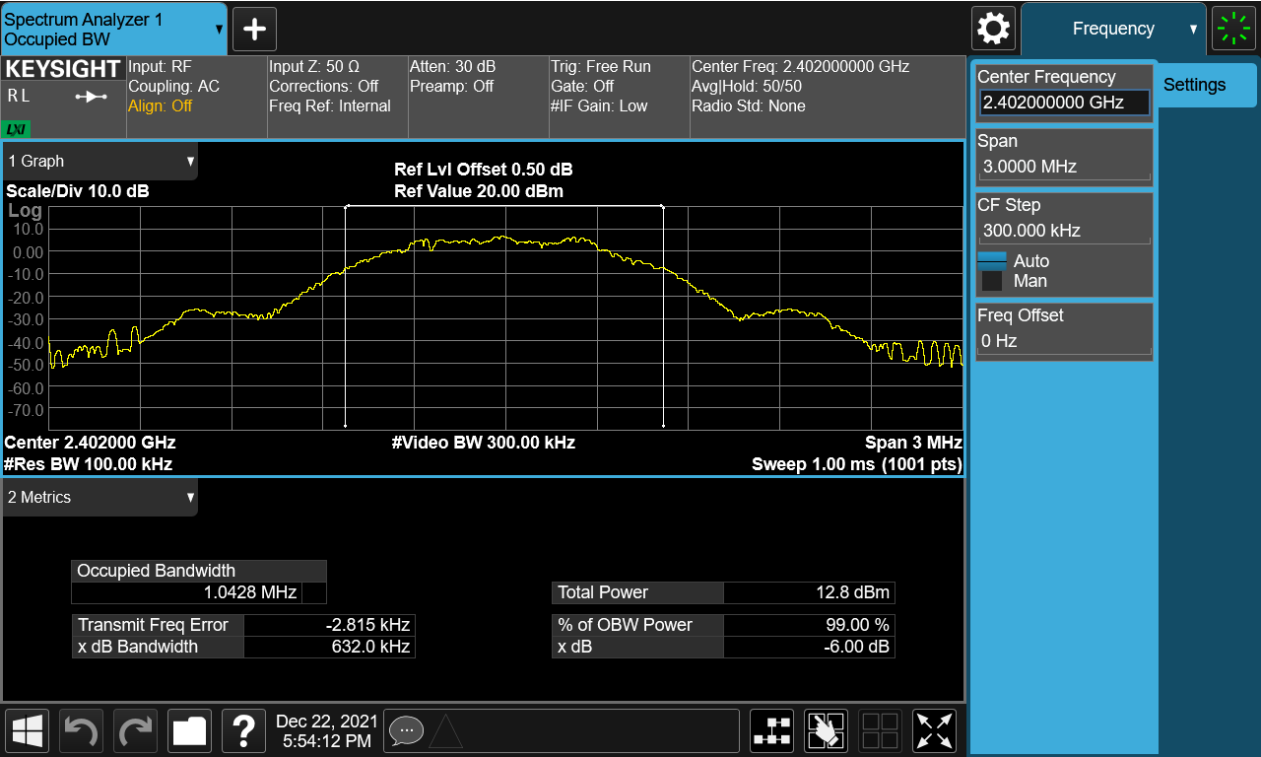
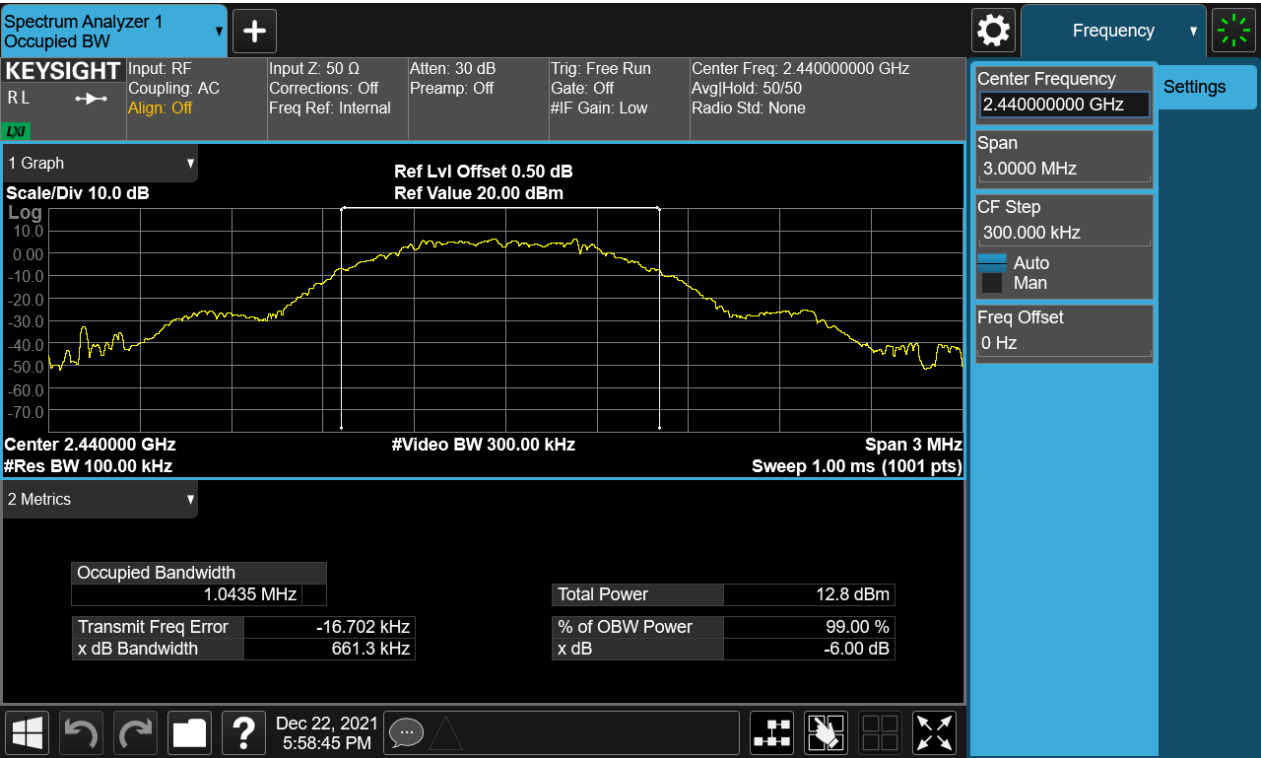


Figure 5: 6dB Bandwidth, 2440MHz



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Figure 6: 6dB Bandwidth, 2480MHz



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## 4.1.4 Power Spectral Density

RESULT:

PASS

Test standard : FCC Part 15.247(e)

Requirement : ANSI C63.10-2013, KDB 558074

Kind of test site : Shielded room

### Test setup

Test Channel : Low/Middle/High

Operation Mode : A.1.a

Ambient temperature : 25°C

Relative humidity : 50%

Table 3: Power Spectral Density

| Test Mode | Test Channel<br>(MHz) | Measured Result<br>(dBm/3kHz) | Limit<br>(dBm/3kHz) |
|-----------|-----------------------|-------------------------------|---------------------|
| BLE       | 2402                  | -8.80                         | ≤8                  |
|           | 2440                  | -8.26                         |                     |
|           | 2480                  | -8.91                         |                     |

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Figure 7: Power Spectral Density, 2402MHz

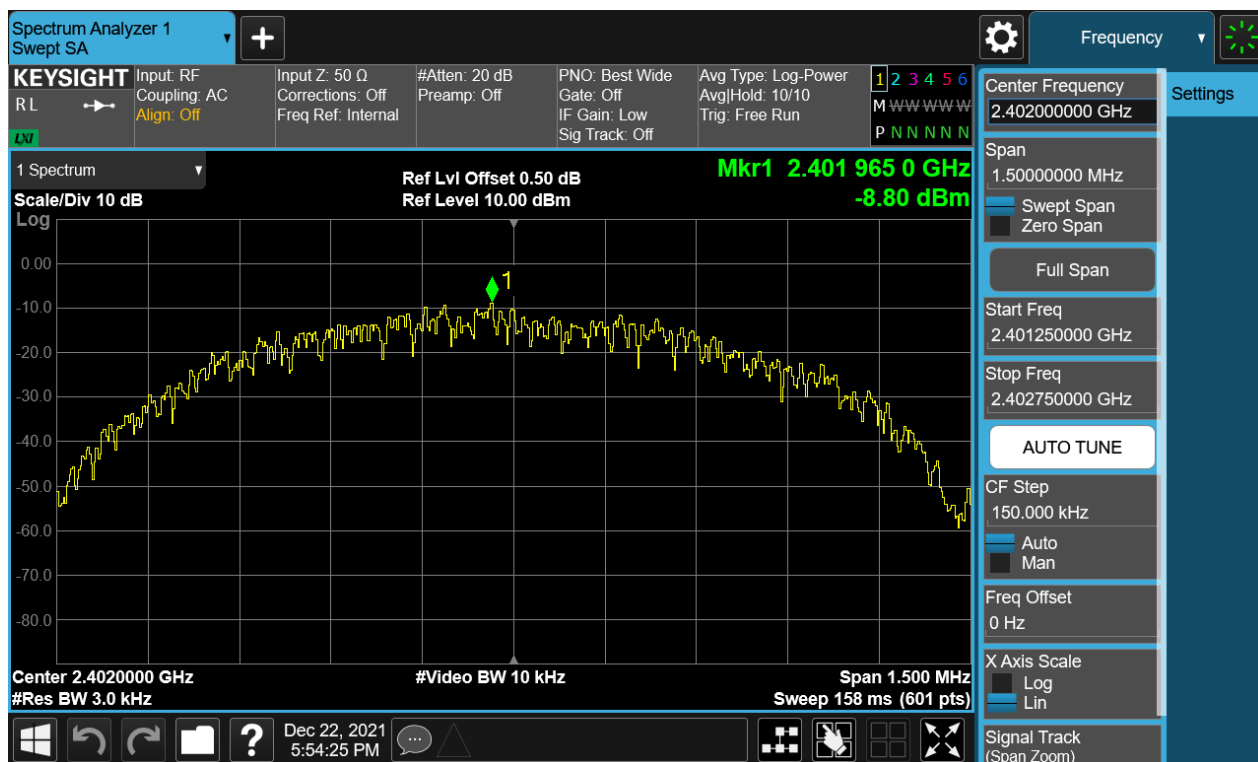


Figure 8: Power Spectral Density, 2440MHz



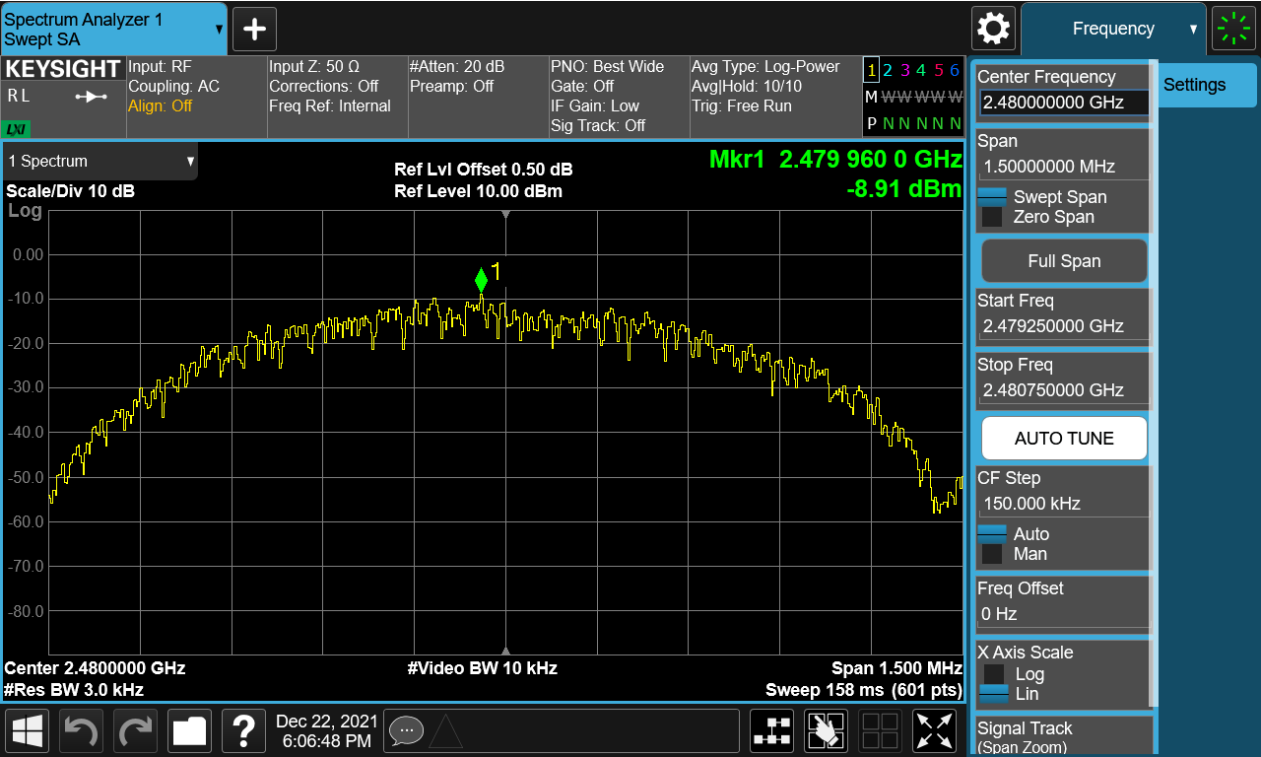
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Figure 9: Power Spectral Density, 2480MHz



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## 4.1.5 Conducted Spurious Emission & Authorized-band band-edge

RESULT:

**PASS**

|                   |                                |
|-------------------|--------------------------------|
| Test standard     | : FCC Part 15.247(d)           |
| Requirement       | : ANSI C63.10-2013, KDB 558074 |
| Kind of test site | : Shielded room                |

### Test setup

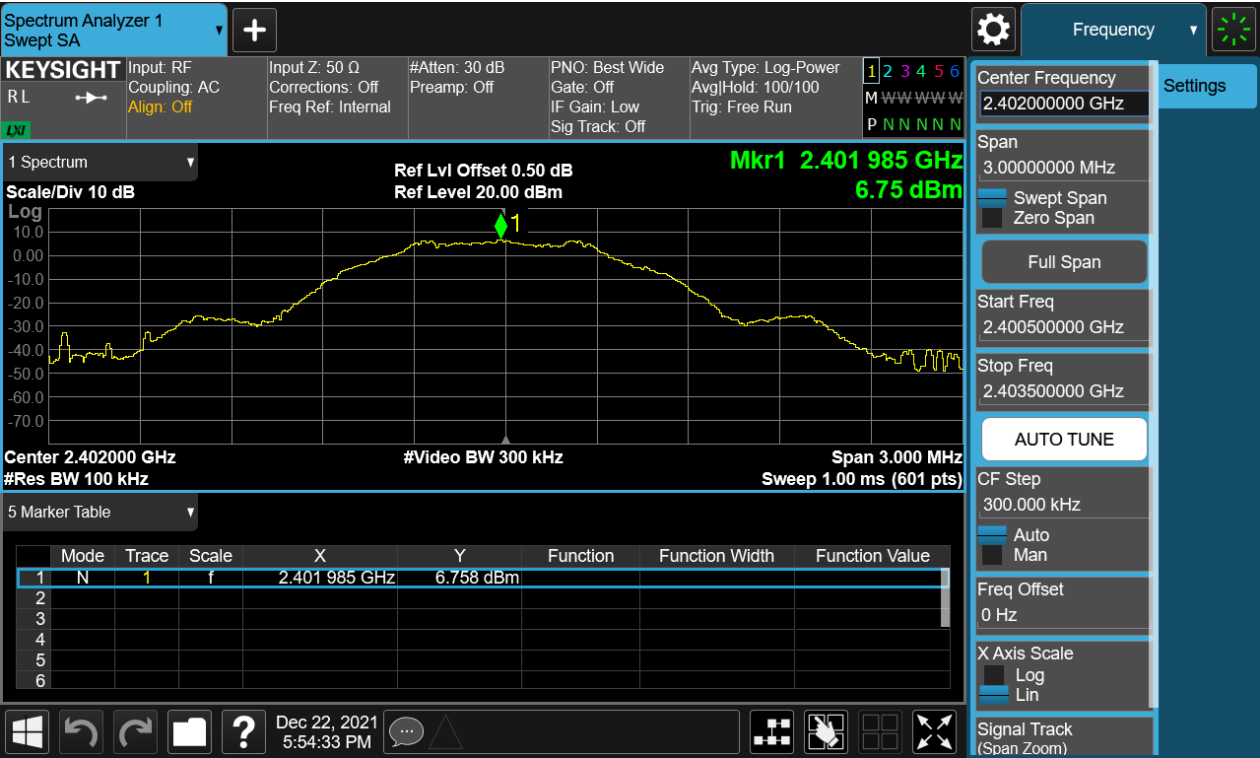
|                     |                                                        |
|---------------------|--------------------------------------------------------|
| Test Channel        | : Low/Middle/High for spurious, Low/High for Band Edge |
| Operation Mode      | : A.1.a                                                |
| Ambient temperature | : 25°C                                                 |
| Relative humidity   | : 50%                                                  |

For details refer to following test plot.

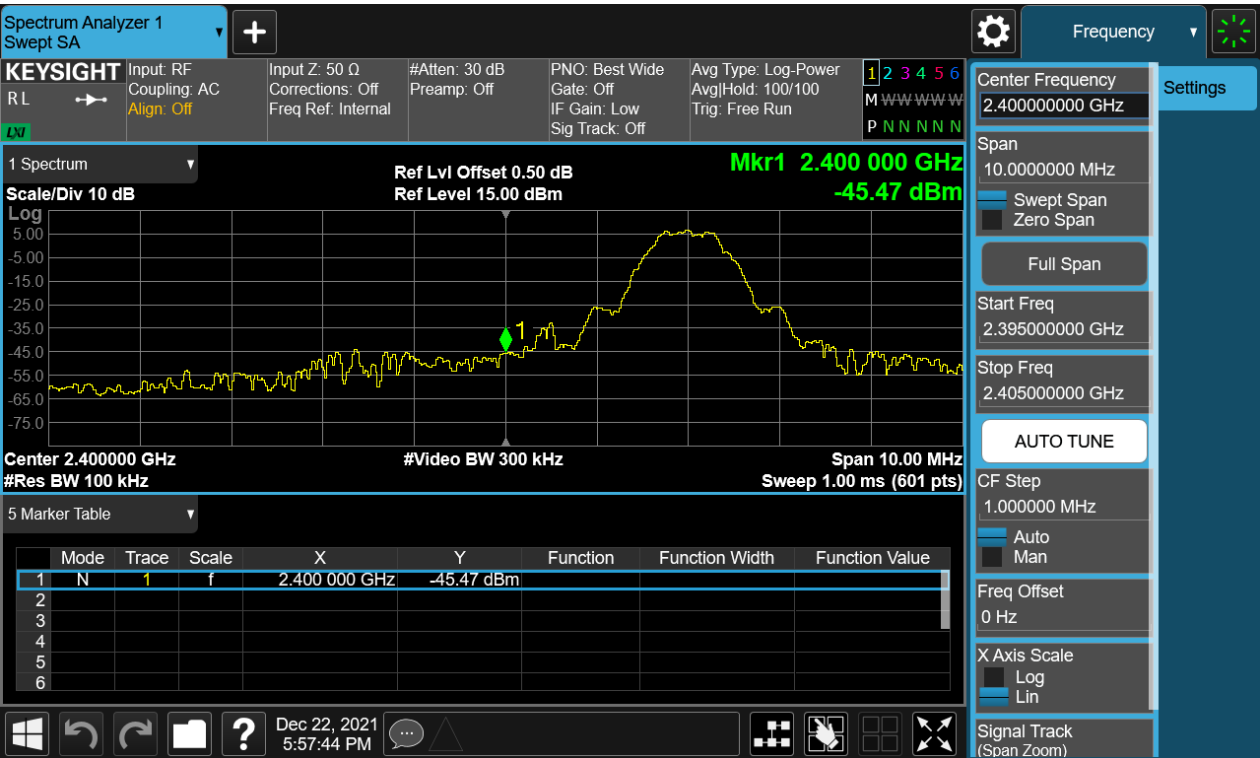
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Figure 10: Conducted Spurious Emission & Authorized-band band-edge, 2402MHz, BLE  
Carrier Level



Band Edge



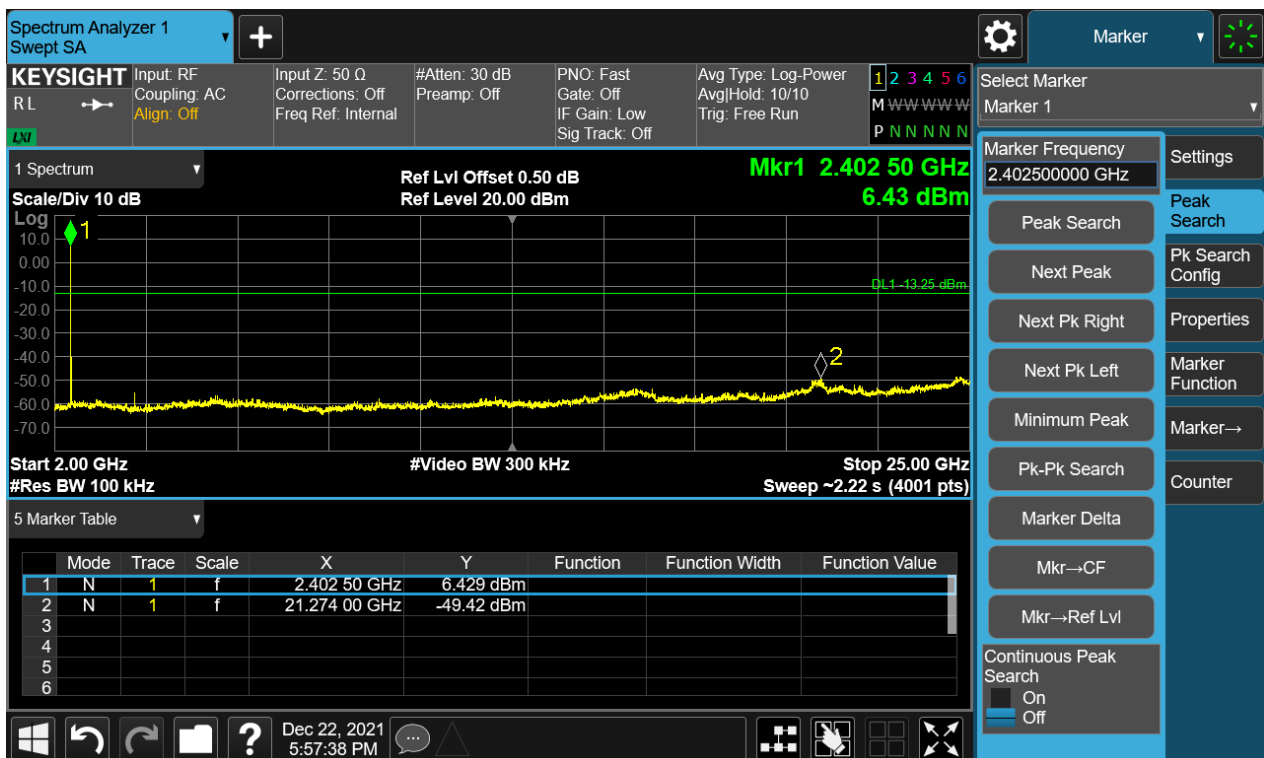
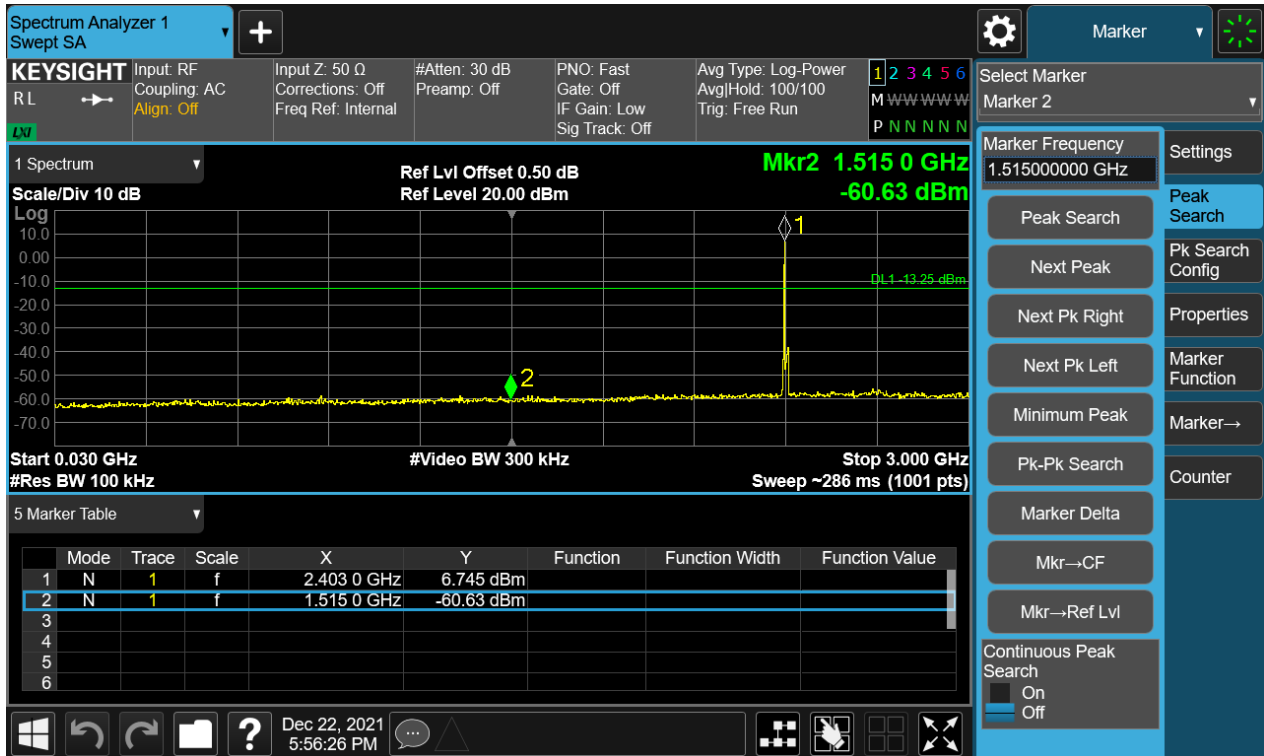
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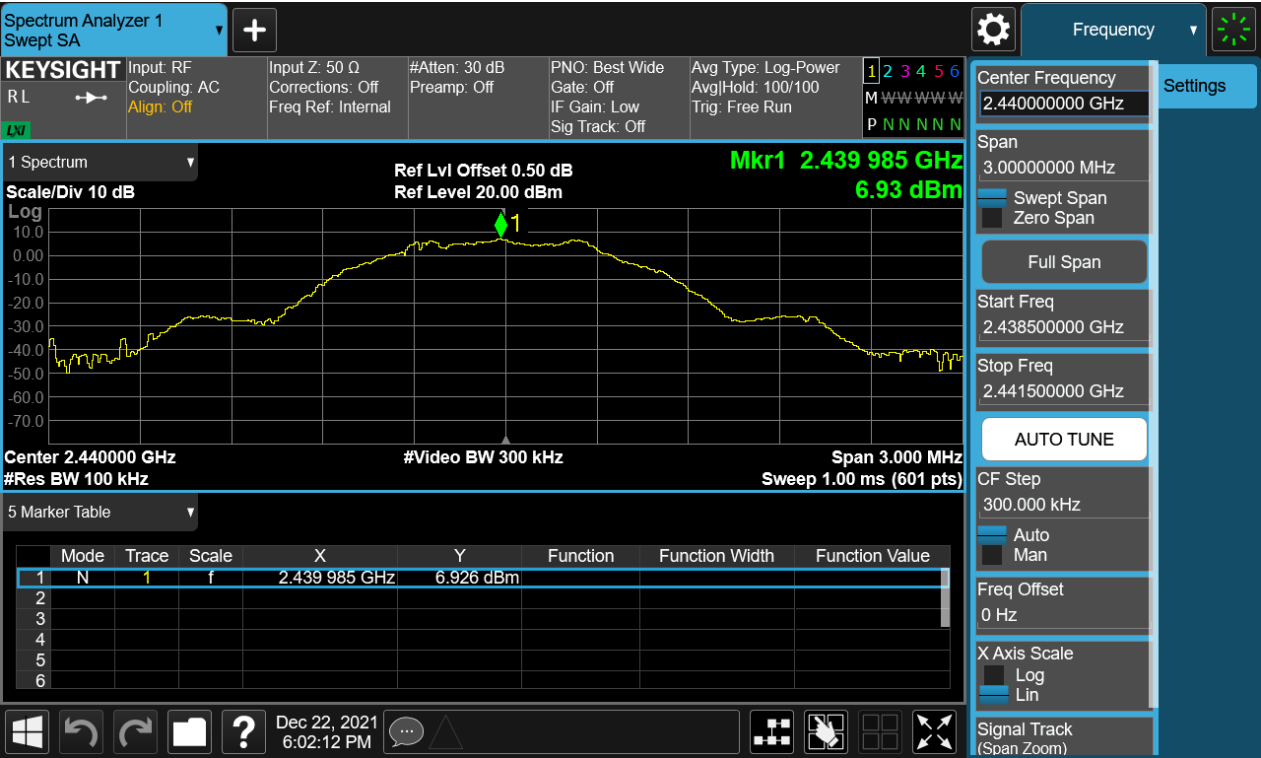
## Conducted spurious emissions 30MHz-25GHz



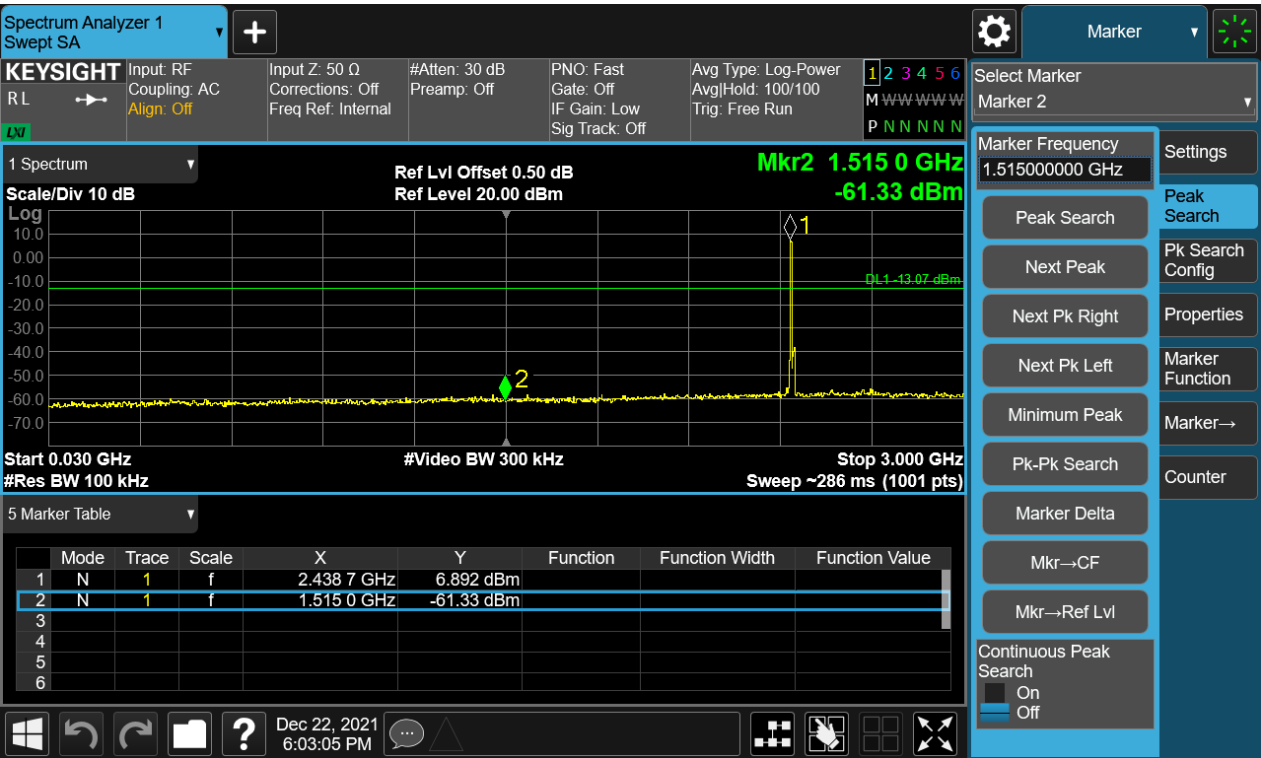
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Figure 11: Conducted Spurious Emission & Authorized-band band-edge, 2440MHz, BLE  
Carrier Level



Conducted spurious emissions 30MHz-25GHz



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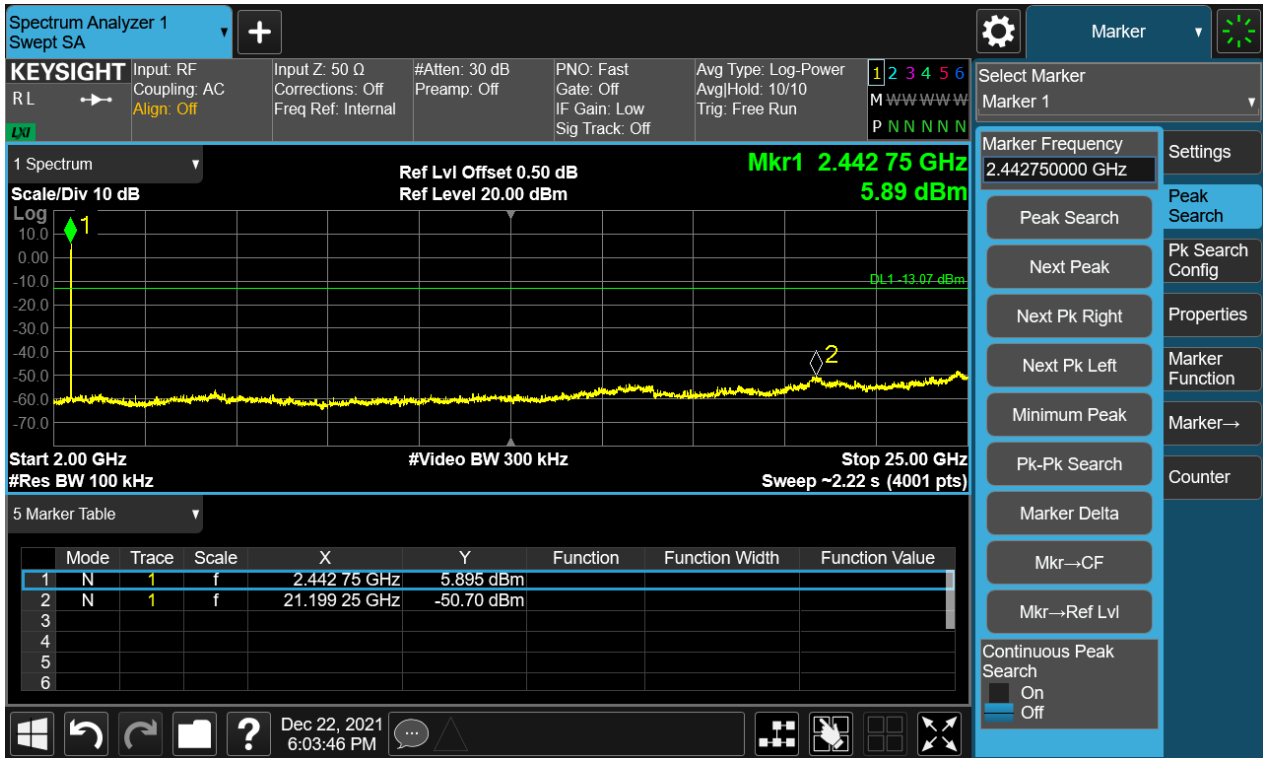
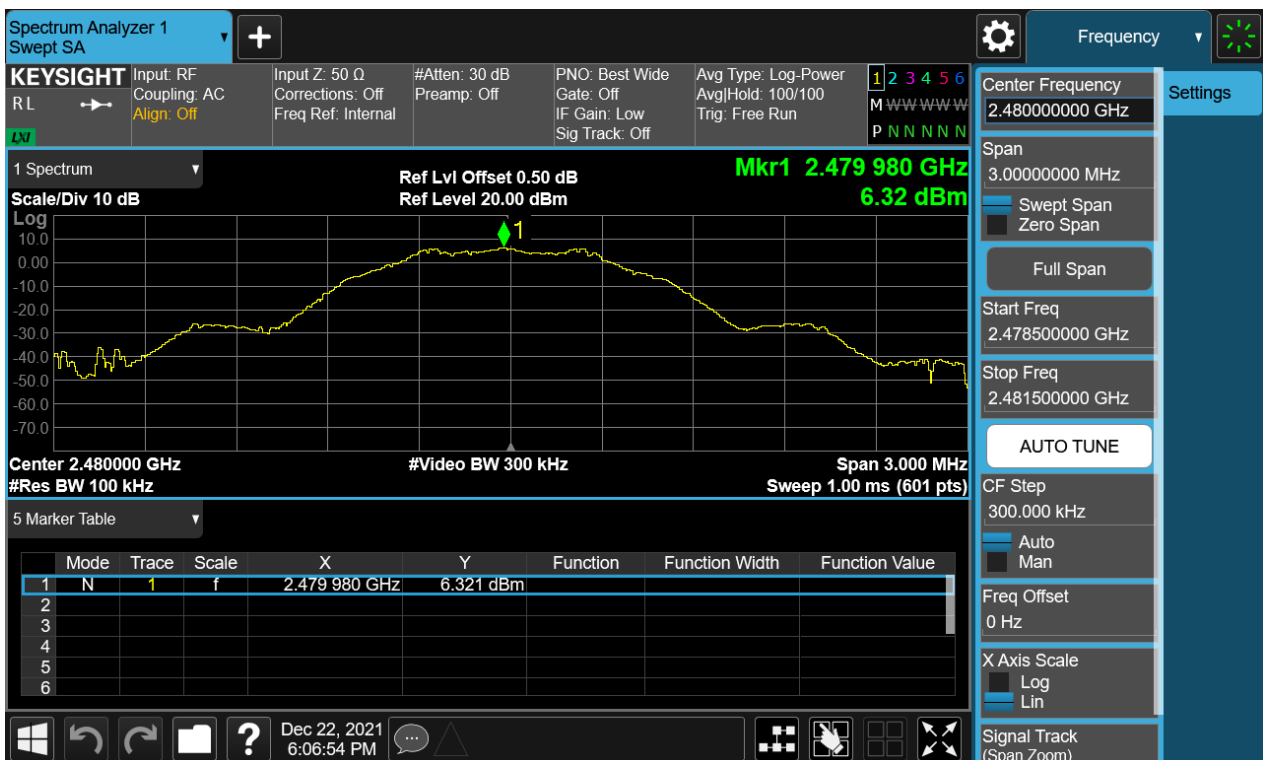


Figure 12: Conducted Spurious Emission & Authorized-band band-edge, 2480MHz, BLE Carrier Level



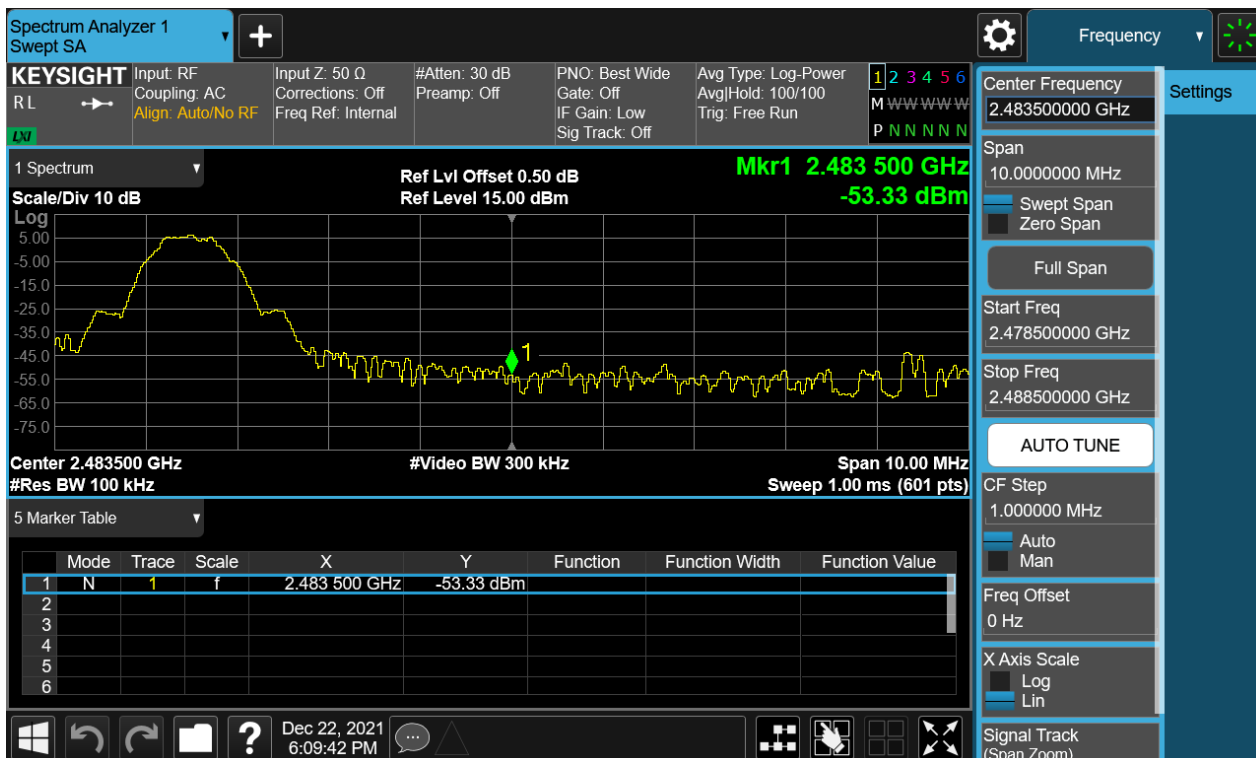
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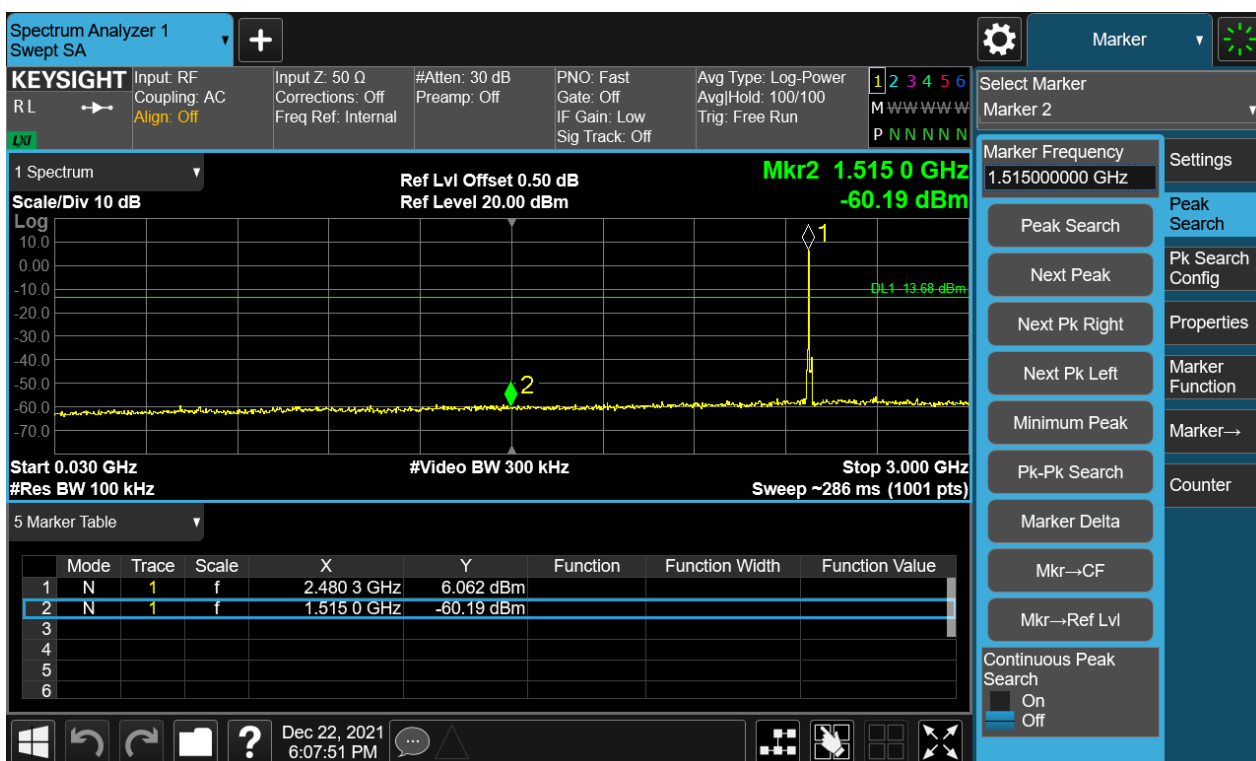
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## Band Edge

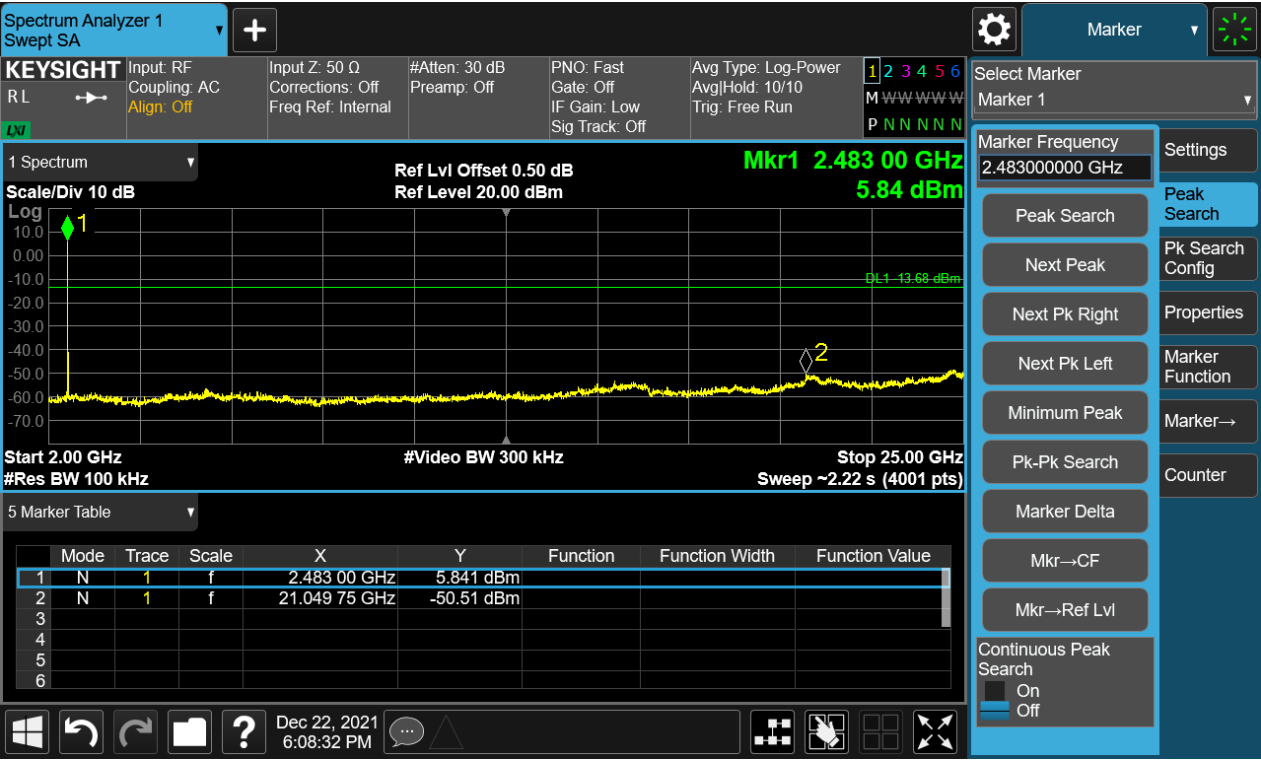


## Conducted spurious emissions 30MHz-25GHz



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## 4.1.6 Radiated Spurious Emission

RESULT:

PASS

|                   |                                      |
|-------------------|--------------------------------------|
| Test standard     | : FCC Part 15.247(d), 15.205, 15.209 |
| Requirement       | : ANSI C63.10-2013, KDB 558074       |
| Kind of test site | : 3m Semi-Anechoic Chamber           |

### Test setup

|                     |                   |
|---------------------|-------------------|
| Test Channel        | : Low/Middle/High |
| Operation Mode      | : A               |
| Ambient temperature | : 16.8°C          |
| Relative humidity   | : 42%             |

### Notes

Test plots please refer to the annex document "SHE21120050-02BE DATA BLE-TX EXHIBIT A OF X-C13SM-0 Model".and "SHE21120050-02BE DATA BLE-TX EXHIBIT A OF X-C13SM-1 Model"

1. For 9 kHz ~ 30 MHz, the amplitude of spurious emissions that are attenuated by more than 20dB below the permissible. The value has no need to be reported.
2. The spurious above 18GHz is noise only and 20dB below the limit. The value has no need to be reported.
3. The EUT is working in the Normal link mode below 1 GHz.
4. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement –X, Y, and Z-plane. The X-plane results were found as the worst case and were shown in this report.

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## 4.1.7 Band Edge (Restricted-band band-edge)

RESULT:

PASS

|                   |                                      |
|-------------------|--------------------------------------|
| Test standard     | : FCC Part 15.247(d), 15.205, 15.209 |
| Requirement       | : ANSI C63.10-2013, KDB 558074       |
| Kind of test site | : 3m Semi-Anechoic Chamber           |

### Test setup

|                     |                   |
|---------------------|-------------------|
| Test Channel        | : Low/Middle/High |
| Operation Mode      | : A.1             |
| Ambient temperature | : 16.3°C          |
| Relative humidity   | : 49%             |

### Notes

1. Test plots please refer to the annex document "SHE21120050-02BE DATA BLE-TX EXHIBIT A OF X-C13SM-0 Model" and "SHE21120050-02BE DATA BLE-TX EXHIBIT A OF X-C13SM-1 Model"
2. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement –X, Y, and Z-plane. The X-plane results were found as the worst case and were shown in this report.

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## 4.2 Mains Emissions

### 4.2.1 Conducted Emission on AC Mains

RESULT:

**PASS**

|                   |                      |
|-------------------|----------------------|
| Test standard     | : FCC Part 15.207(a) |
| Requirement       | : ANSI C63.10-2013   |
| Kind of test site | : Shielded room      |

#### Test setup

|                     |                                             |
|---------------------|---------------------------------------------|
| Input Voltage       | : DC 5V by pc (which received AC 120V 60Hz) |
| Operation Mode      | : A.2                                       |
| Earthing            | : Not Connected                             |
| Ambient temperature | : 23°C                                      |
| Relative humidity   | : 51%                                       |

For details refer to following test plot.

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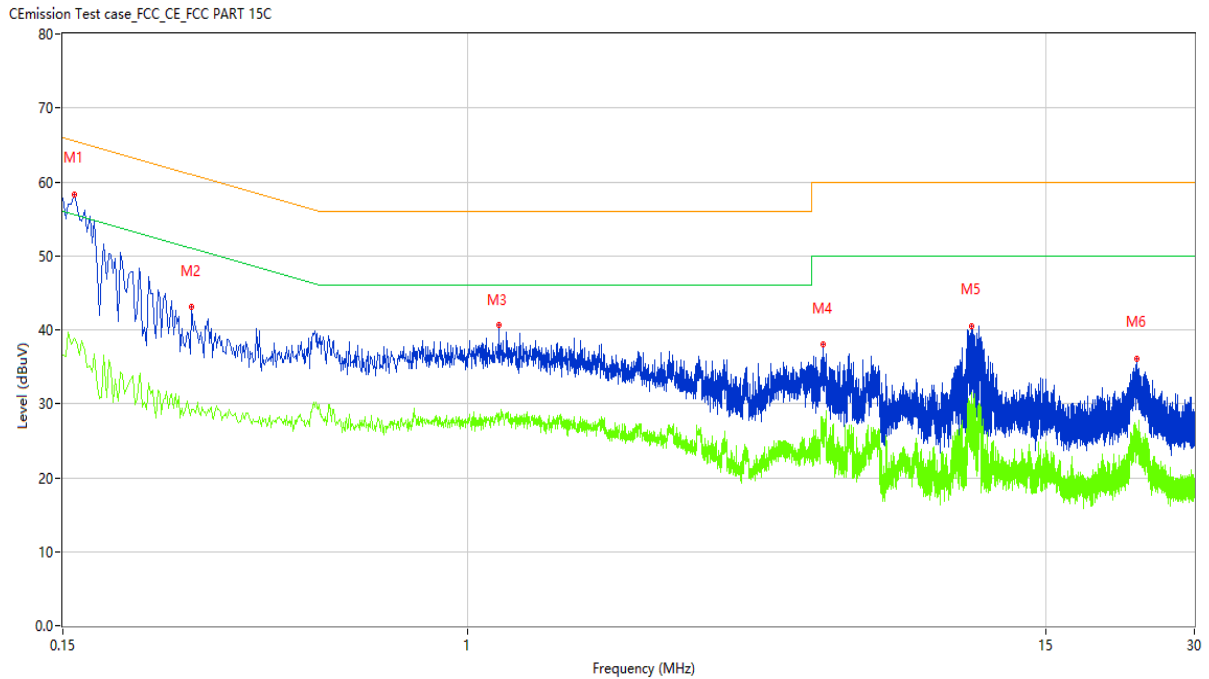
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Note: The all configurations were tested respectively, but only the worst configuration shown here.

Figure 13: Conducted Emission on AC Mains, L Phase



| No. | Frequency (MHz) | Results (dBuV) | Factor (dB) | Limit (dBuV) | Over Limit (dB) | Detector | Line | Verdict |
|-----|-----------------|----------------|-------------|--------------|-----------------|----------|------|---------|
| 1   | 0.158           | 59.05          | 10.26       | 65.57        | -6.52           | Peak     | L    | Pass    |
| 1*  | 0.158           | 53.85          | 10.26       | 65.57        | -11.72          | QP       | L    | Pass    |
| 1** | 0.158           | 38.83          | 10.26       | 55.57        | -16.74          | AV       | L    | Pass    |
| 2   | 0.274           | 41.80          | 10.22       | 61.00        | -19.20          | Peak     | L    | Pass    |
| 2*  | 0.274           | 35.99          | 10.22       | 61.00        | -25.01          | QP       | L    | Pass    |
| 2** | 0.274           | 29.14          | 10.22       | 51.00        | -21.86          | AV       | L    | Pass    |
| 3   | 1.156           | 34.55          | 10.19       | 56.00        | -21.45          | Peak     | L    | Pass    |
| 3*  | 1.156           | 29.12          | 10.19       | 56.00        | -26.88          | QP       | L    | Pass    |
| 3** | 1.156           | 27.68          | 10.19       | 46.00        | -18.32          | AV       | L    | Pass    |
| 4   | 5.274           | 36.06          | 10.27       | 60.00        | -23.94          | Peak     | L    | Pass    |
| 4*  | 5.274           | 29.74          | 10.27       | 60.00        | -30.26          | QP       | L    | Pass    |
| 4** | 5.274           | 27.53          | 10.27       | 50.00        | -22.47          | AV       | L    | Pass    |
| 5   | 10.558          | 40.39          | 10.38       | 60.00        | -19.61          | Peak     | L    | Pass    |
| 5*  | 10.558          | 34.18          | 10.38       | 60.00        | -25.82          | QP       | L    | Pass    |
| 5** | 10.558          | 30.51          | 10.38       | 50.00        | -19.49          | AV       | L    | Pass    |
| 6   | 22.892          | 34.72          | 11.00       | 60.00        | -25.28          | Peak     | L    | Pass    |
| 6*  | 22.892          | 29.53          | 11.00       | 60.00        | -30.47          | QP       | L    | Pass    |
| 6** | 22.892          | 26.21          | 11.00       | 50.00        | -23.79          | AV       | L    | Pass    |

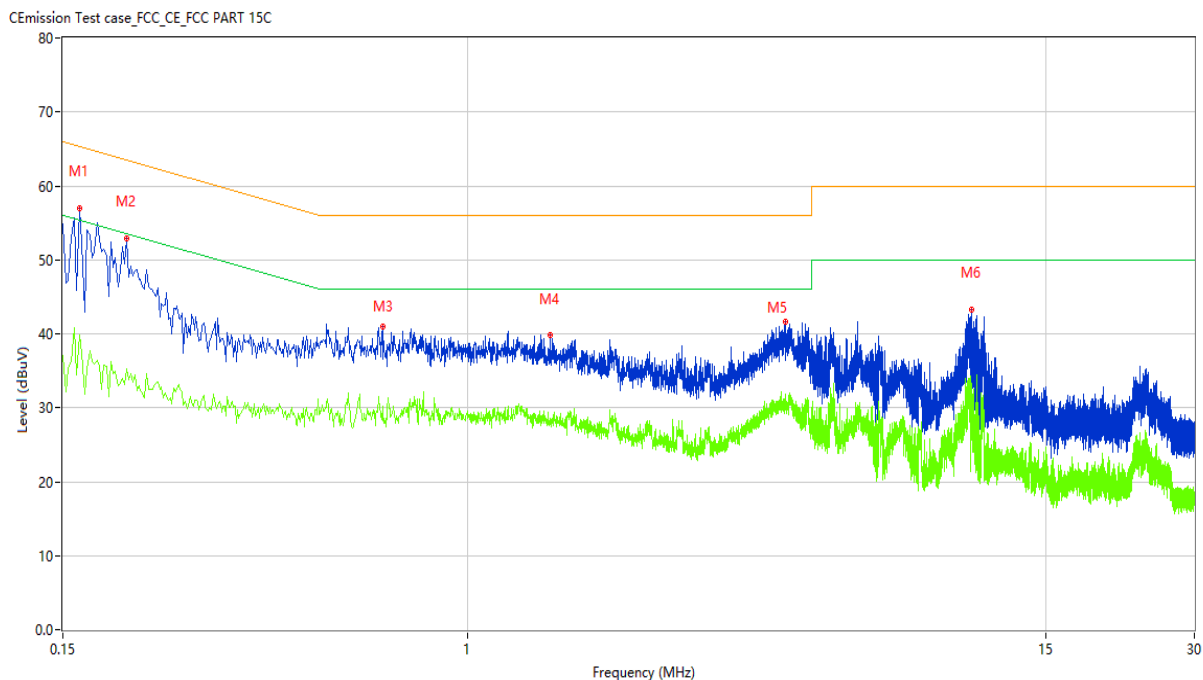
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**Figure 14: Conducted Emission on AC Mains, N Phase**



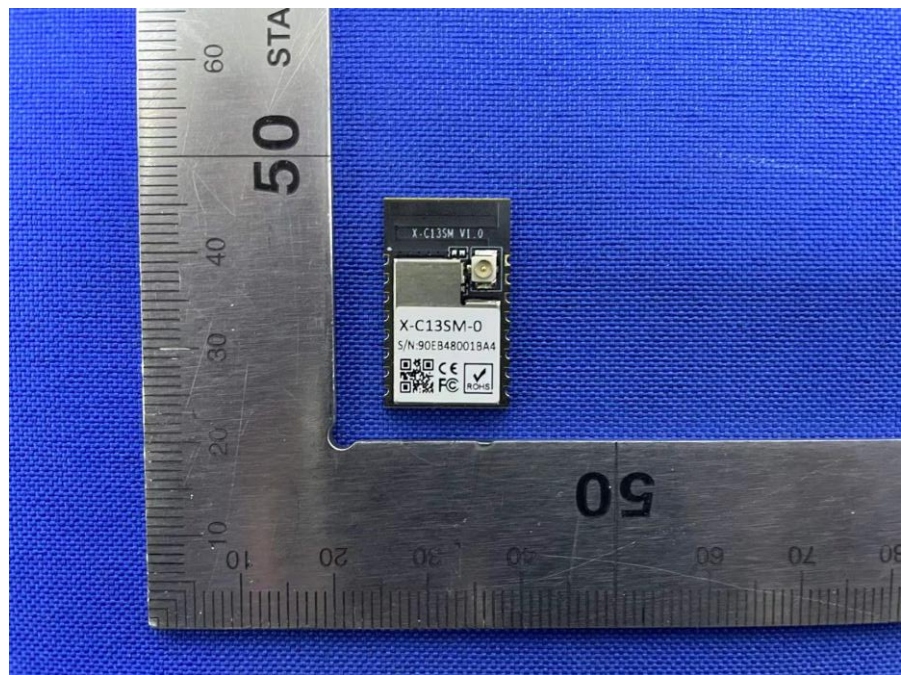
| No. | Frequency (MHz) | Results (dBuV) | Factor (dB) | Limit (dBuV) | Over Limit (dB) | Detector | Line | Verdict |
|-----|-----------------|----------------|-------------|--------------|-----------------|----------|------|---------|
| 1   | 0.156           | 48.80          | 10.26       | 65.67        | -16.87          | Peak     | N    | Pass    |
| 1*  | 0.156           | 39.41          | 10.26       | 65.67        | -26.26          | QP       | N    | Pass    |
| 1** | 0.156           | 36.30          | 10.26       | 55.67        | -19.37          | AV       | N    | Pass    |
| 2   | 0.202           | 42.41          | 10.23       | 63.53        | -21.12          | Peak     | N    | Pass    |
| 2*  | 0.202           | 33.39          | 10.23       | 63.53        | -30.14          | QP       | N    | Pass    |
| 2** | 0.202           | 35.22          | 10.23       | 53.53        | -18.31          | AV       | N    | Pass    |
| 3   | 0.670           | 31.79          | 10.32       | 56.00        | -24.21          | Peak     | N    | Pass    |
| 3*  | 0.670           | 23.87          | 10.32       | 56.00        | -32.13          | QP       | N    | Pass    |
| 3** | 0.670           | 30.15          | 10.32       | 46.00        | -15.85          | AV       | N    | Pass    |
| 4   | 1.468           | 31.08          | 10.18       | 56.00        | -24.92          | Peak     | N    | Pass    |
| 4*  | 1.468           | 24.25          | 10.18       | 56.00        | -31.75          | QP       | N    | Pass    |
| 4** | 1.468           | 28.56          | 10.18       | 46.00        | -17.44          | AV       | N    | Pass    |
| 5   | 4.422           | 27.70          | 10.23       | 56.00        | -28.30          | Peak     | N    | Pass    |
| 5*  | 4.422           | 21.09          | 10.23       | 56.00        | -34.91          | QP       | N    | Pass    |
| 5** | 4.422           | 31.85          | 10.23       | 46.00        | -14.15          | AV       | N    | Pass    |
| 6   | 10.578          | 28.65          | 10.38       | 60.00        | -31.35          | Peak     | N    | Pass    |
| 6*  | 10.578          | 22.48          | 10.38       | 60.00        | -37.52          | QP       | N    | Pass    |
| 6** | 10.578          | 33.26          | 10.38       | 50.00        | -16.74          | AV       | N    | Pass    |

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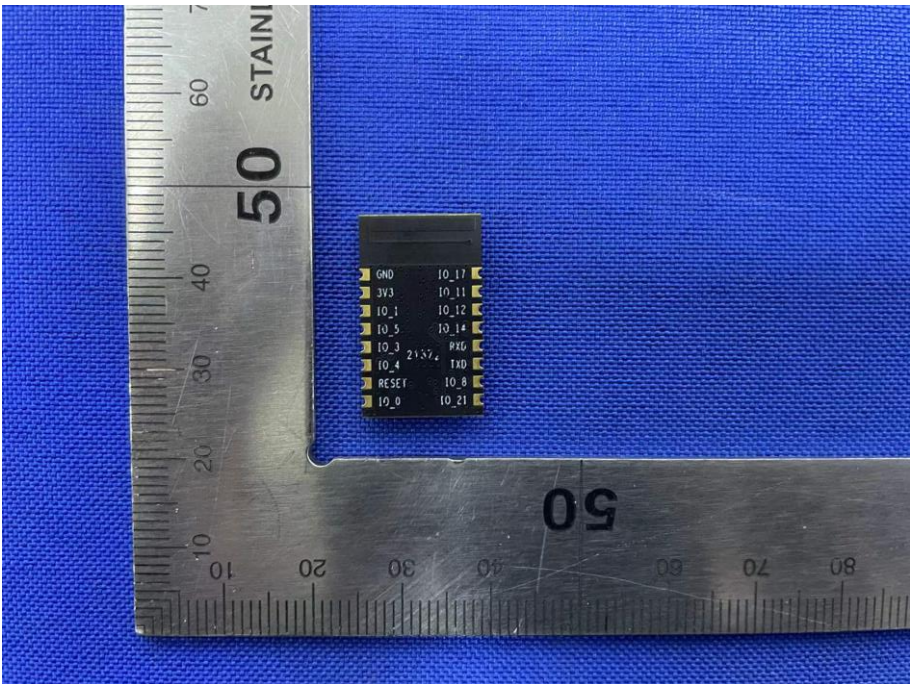
## 5 Appendixes

### 5.1 Photographs of the Sample

X-C13SM-0 Model



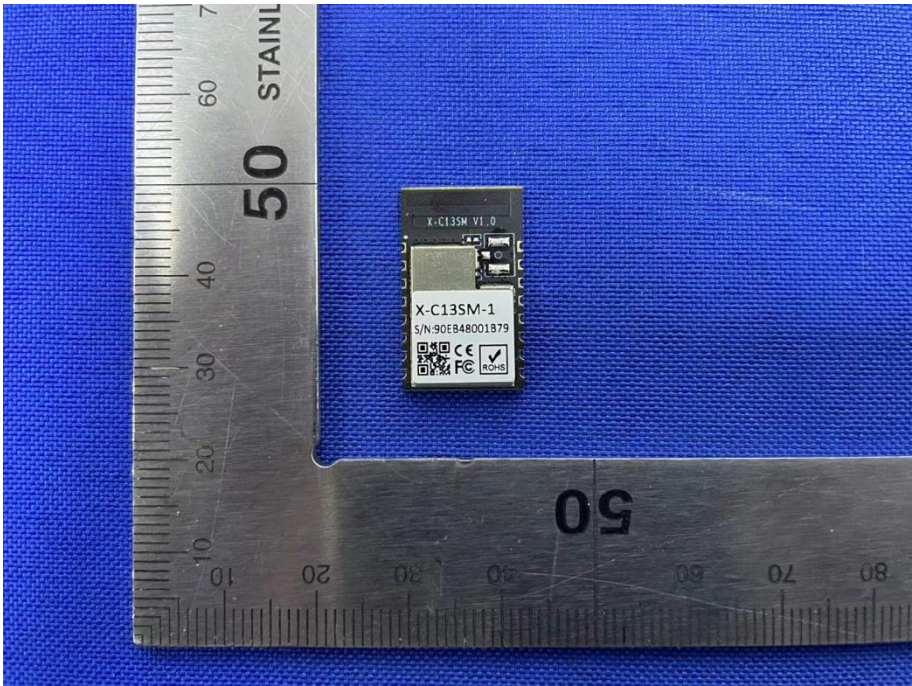
Front of the sample



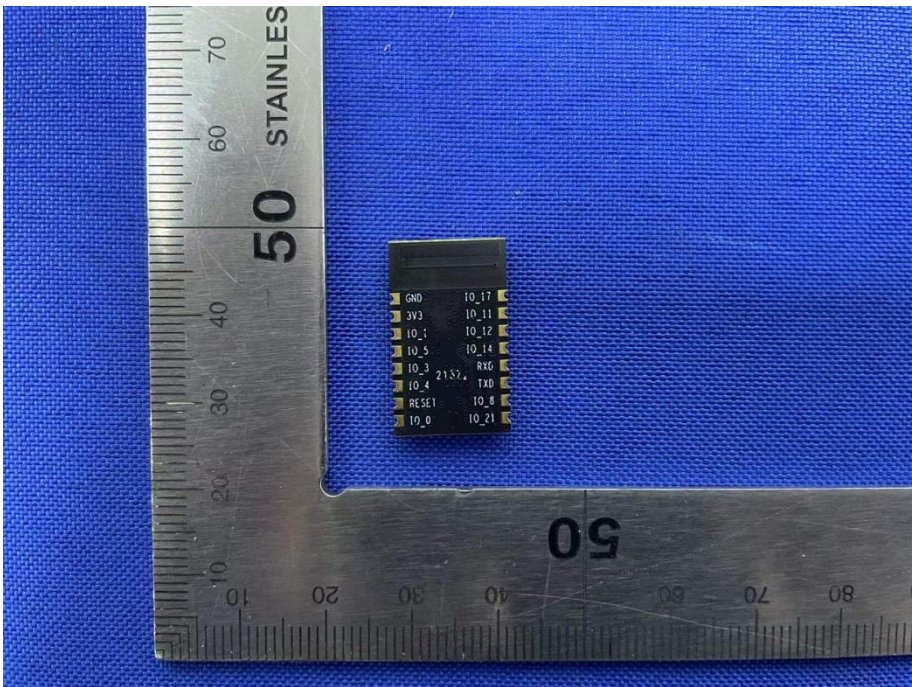
Rear of the sample

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X-C13SM-1 Model



Front of the sample



Rear of the sample

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## 5.2 Set-up for Conducted Emissions



## 5.3 Set-up for Conducted RF test at Antenna Port



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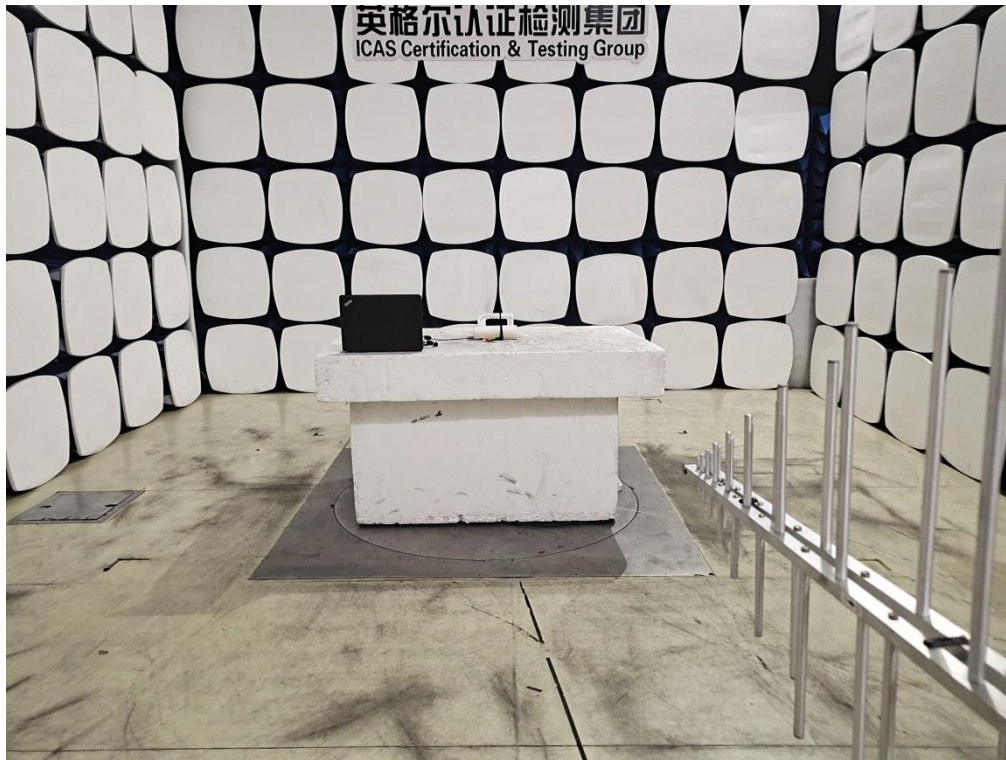
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## 5.4 Set-up for Spurious Emissions below 1GHz



## 5.5 Set-up for Spurious Emissions above 1GHz



\*\*\*End of the report\*\*\*